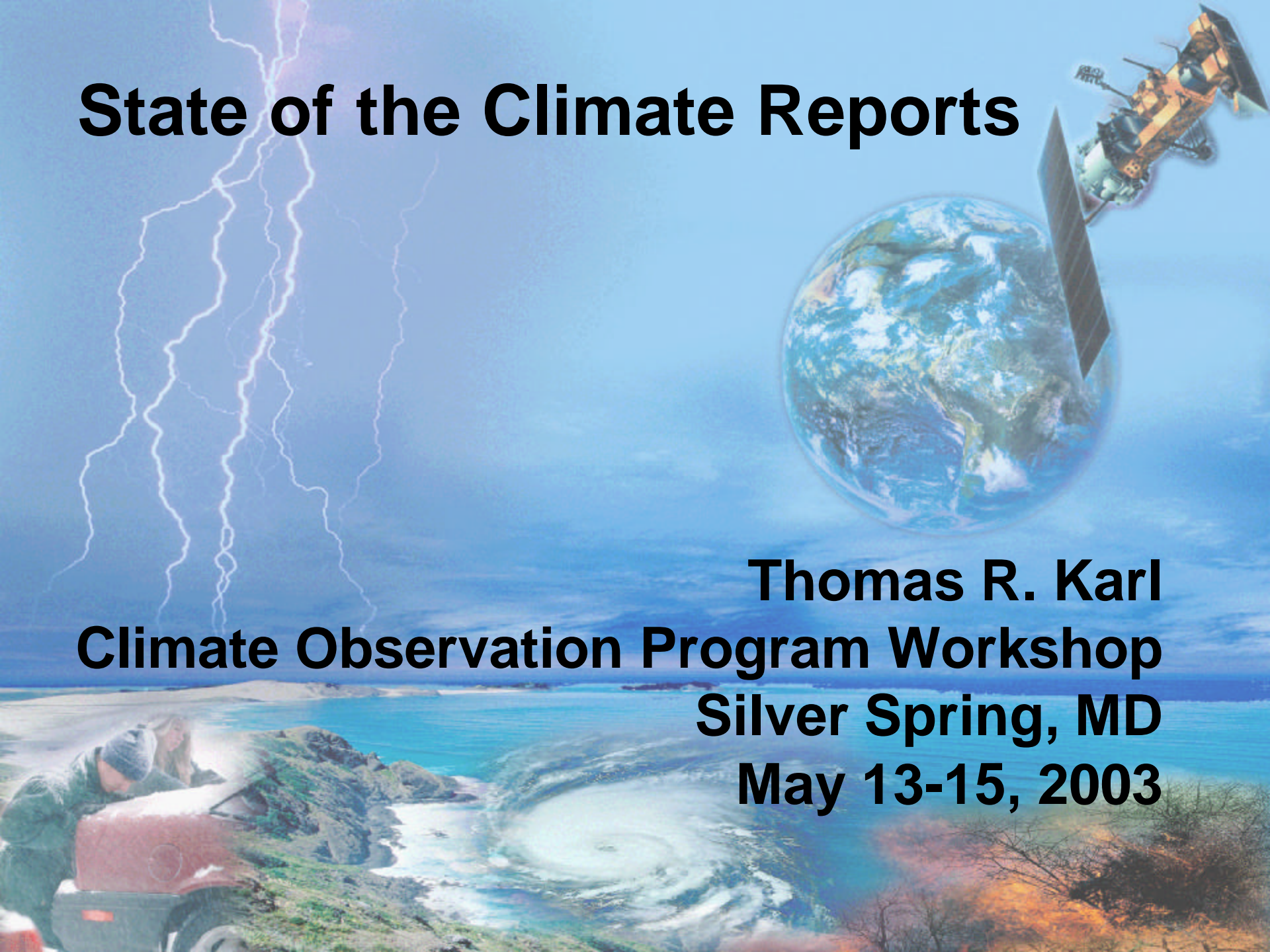


# **State of the Climate Reports**

**Thomas R. Karl  
Climate Observation Program Workshop  
Silver Spring, MD  
May 13-15, 2003**



# What this Briefing Covers

- ✓ **NCDC Monthly and Seasonal Reports**
  - Process and Datasets
- ✓ **NCDC Annual Reports**
  - Cooperation with the WMO
- ✓ **The BAMS State of the Climate report**
  - Authors and History of the report
  - Authorship Process
  - State of the Climate for 2002 – A Brief Review



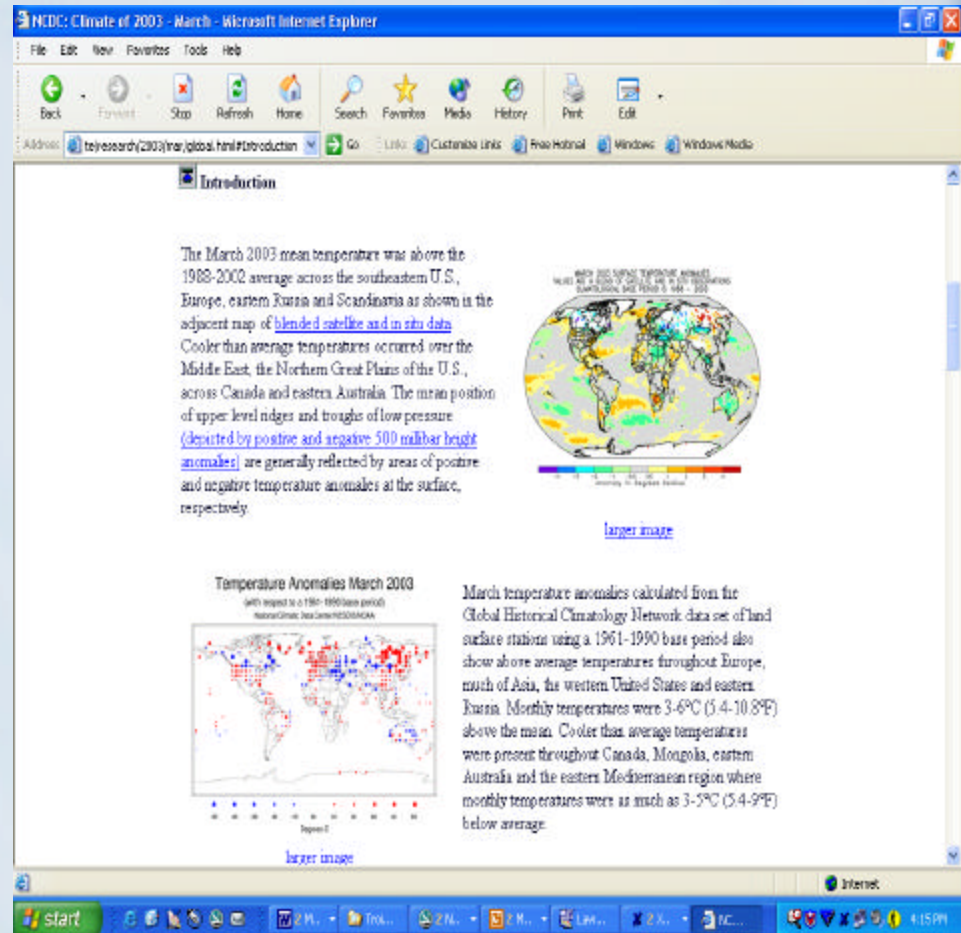
# Monthly and Seasonal Reports

- ✓ Web-based
- ✓ First established during the El Nino episode of 1997-98 to provide continuing updates of the State of the Climate
- ✓ Places the previous month's/season's climate in historical perspective
- ✓ For the general public, scientists and government officials



# Monthly and Seasonal Reports

- ✓ More than 300 images
- ✓ Data collected during first 7 days of the month
- ✓ Preliminary US statistics available by the 5th of the month
- ✓ Textual summaries written and placed on the web by the 15th of the month



# Monthly and Seasonal Reports

## Contents

### ✓ Global:

- Surface Temperature and Precipitation
- Troposphere and Stratosphere Temperatures
- Snow Cover

### ✓ Global Hazards:

- Drought, Flooding, Severe Storms, Tropical and Extratropical Cyclones, and Severe Winter Weather

### ✓ US National:

- Temp, Precip, Atlantic Hurricanes and Winter storms

### ✓ US Drought:

- National, Regional and Local Perspectives

### ✓ US Climate Extremes:



# Monthly and Seasonal Reports

## Data Sources

- ✓ Investment in data set development which began during the past 10 to 20 years provides the means to monitor US and Global Climate
  - U.S. Divisional Data Base - 1983
  - Comprehensive Ocean-Atmosphere Dataset (COADS) – 1985
  - United States Historical Climatology Network (USHCN) - 1983
  - Global Historical Climatology Network (GHCN) - 1991
  - Comprehensive Aerological Reference Dataset (CARDS)
  - Blended Satellite, in-situ and SST Temperature Dataset
  - Extended Reconstructed Sea Surface Temperature Dataset (ERSST) - 2002

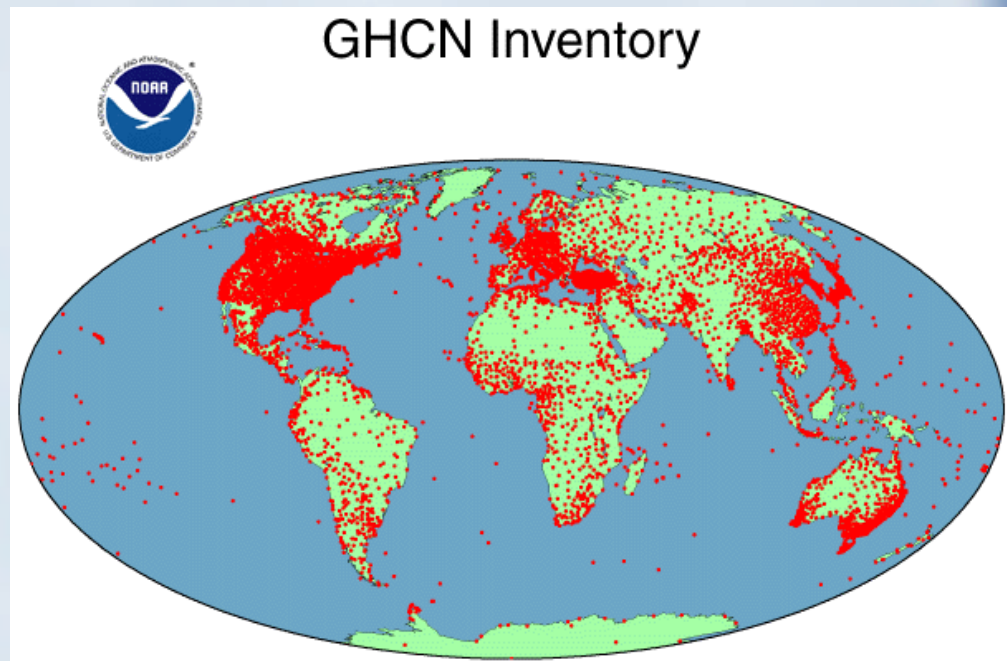


# Monthly and Seasonal Reports

## Data Sources

### Monthly In Situ Data

- ✓ GHCN
  - Temperature, Precipitation and Sea Level Pressure Data
- ✓ Smith and Reynolds
  - Extended Reconstructed SSTs and Sea Level Pressure Data
- ✓ USHCN
  - Temperature and Precipitation

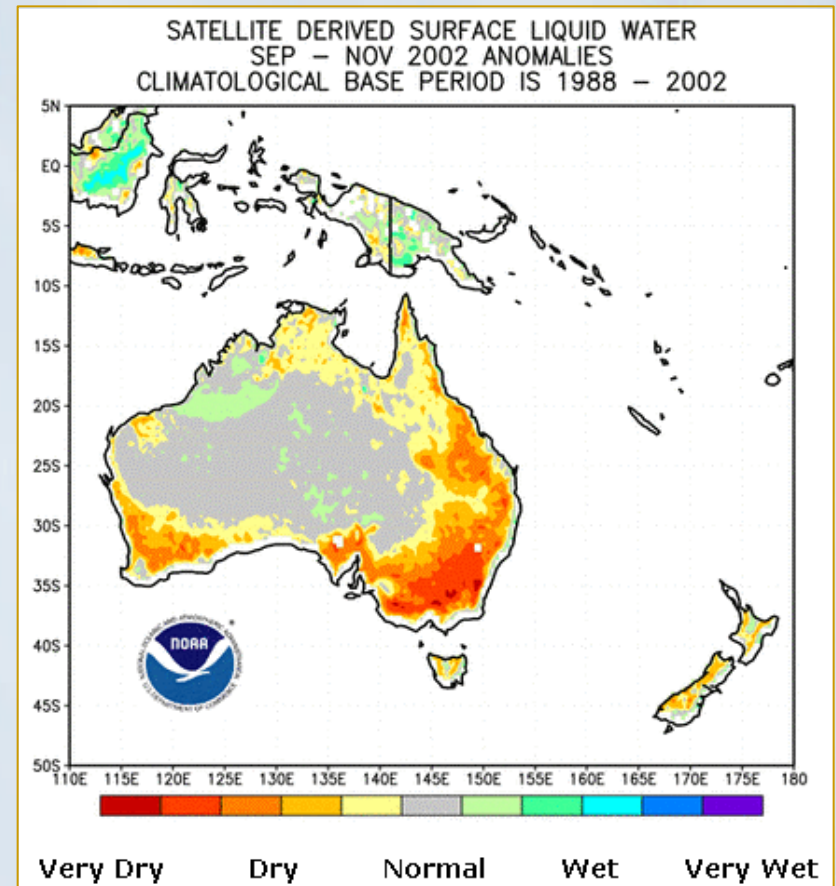


# Monthly and Seasonal Reports

## Data Sources

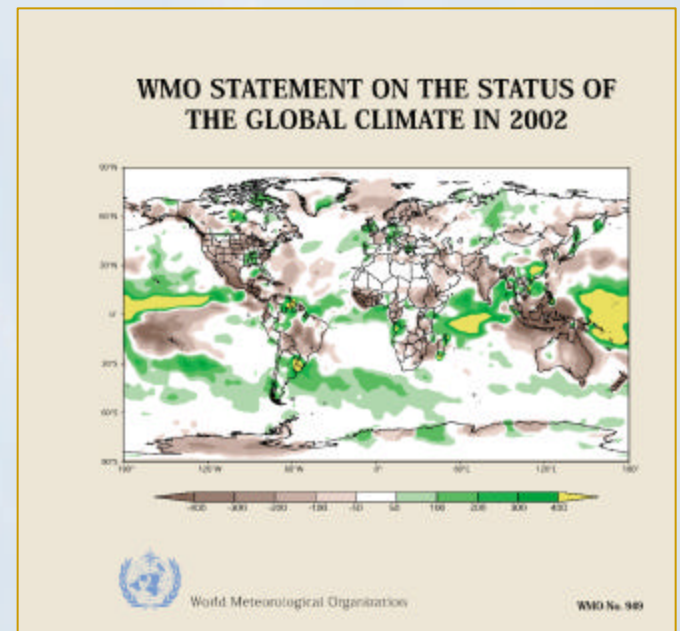
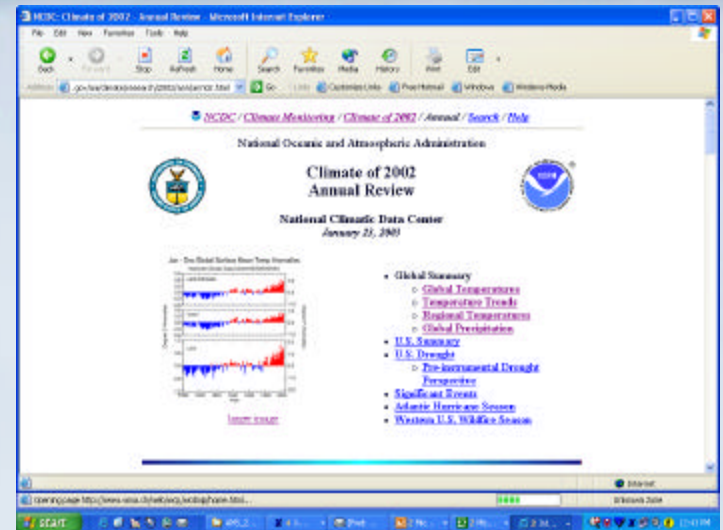
### Other Datasets

- ✓ MSU Troposphere and Stratosphere Temperatures
  - Univ of Alabama at Huntsville
  - Remote Sensing Systems
- ✓ SSM/I Surface Temperature, Wetness and Snow Cover
- ✓ Global Daily Climatology Network
- ✓ Integrated Surface Hourly Data



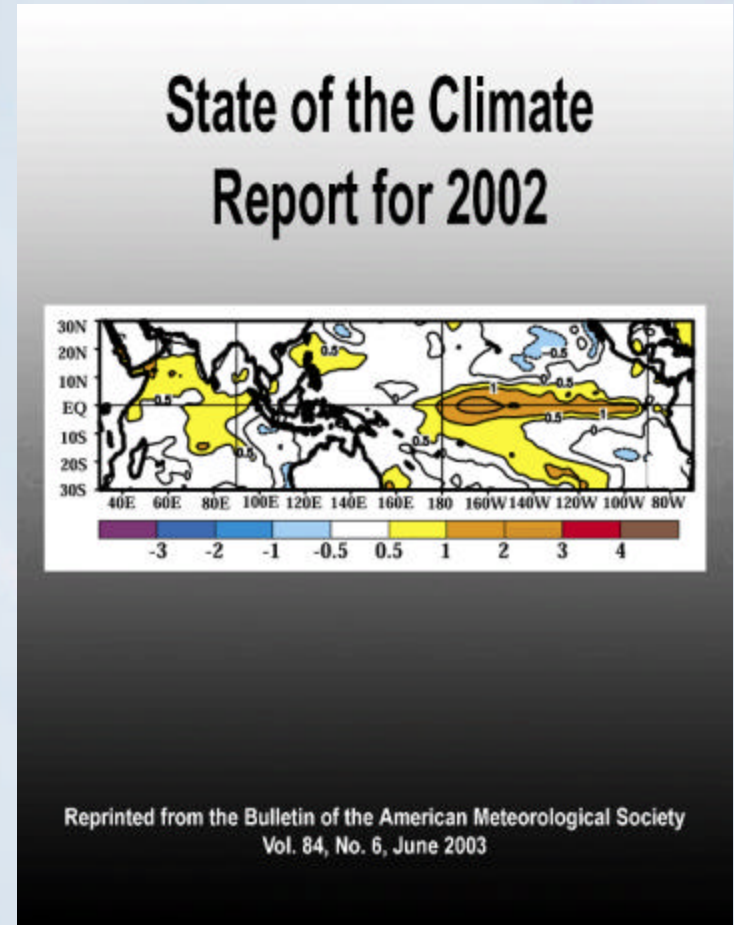
# Annual Report

- ✓ Preliminary report completed in mid-December
- ✓ Worked closely with WMO in last 3 years
  - Statement on the Status of the Global Climate
- ✓ NOAA and WMO end-of-year press conferences



# BAMS State of the Climate

- ✓ Web-based State of the Climate reports form the foundation for annually published report
- ✓ 60 page summary of the previous year's weather and climate
- ✓ Includes 80 color graphs and maps of current and historical climate



# 26 Authors from 16 Institutions in 8 Countries

- ✓ NOAA
  - National Climatic Data Center
  - Climate Prediction Center
  - Climate Monitoring and Diagnostics Laboratory
- ✓ US Universities
  - Rutgers University, New Brunswick, NJ
  - University of Alabama, Huntsville, AL
  - Creighton University, NE
  - Climate System Research Center, University of Mass, Amherst, MA
  - International Research Institute for Climate Prediction (IRI), NY
  - Colorado State University, CO
- ✓ Environment Canada, Ottawa, Canada
- ✓ Hadley Centre for Climate Prediction and Research, UK
- ✓ Drought Monitoring Centre, Nairobi, Kenya
- ✓ All Russian Research Institute of Hydromet. Information, Obninsk, Russia
- ✓ South African Weather Service, South Africa
- ✓ National Institute of Water and Atmos. Research, Auckland, New Zealand
- ✓ Australian Bureau of Meteorology, Melbourne, Australia



# BAMS State of the Climate

## History of the Report

- ✓ Initiated 13 years ago by the Climate Prediction Center (CPC)
  - An internally published report at that time
  - Titled the 'Climate Assessment'
- ✓ Primary focus on climate diagnostics
- ✓ Content and participation from external organizations continued to grow
- ✓ First published in BAMS in 1995
- ✓ NCDC became the lead organization with the 2000 report
  - Focus more on characterizing State of the Climate



# **BAMS State of the Climate**

## **Published as a Special Supplement**

- ✓ Page charge costs funded by NOAA's Office of Global Programs
- ✓ Publication costs significantly reduced due to Desktop Publication by lead agency
  - Layout and design performed by NCDC using Adobe Pagemaker Software



# BAMS State of the Climate

## Authorship Process (1 of 3)

- ✓ Latter 3 months of the calendar year
  - Lead author develops outline for annual report
  - Obtains commitments from contributors to author individual sections
  
- ✓ January and first half of February
  - Section authors prepare contributions
  - Provide contributions (text and graphics) to lead author (now editors) by middle to end of February
    - Text sent as Word or Wordperfect Document
    - Graphics typically prepared as postscript or Adobe Illustrator format



# BAMS State of the Climate

## Authorship Process (2 of 3)

### ✓ March

- Contributions edited and written into a single doc.
- Images modified for consistency and to ensure of publication quality in some cases
- Publication quality article created using Desktop Publishing Software
- Report sent to BAMS at end of the month

### ✓ April

- Peer review



# **BAMS State of the Climate**

## **Authorship Process (3 of 3)**

- ✓ Late April
  - Article returned to lead editor for final modifications
- ✓ Early May
  - Final article returned to BAMS
- ✓ June
  - Article published
  - Bound reprints produced



# BAMS State of the Climate

## Person-Hour Requirements

- ✓ Lead editor
  - 40 hours during latter few months of year
  - 40 hours in January
  - 80 hours in February
  - 160 hours in March
- ✓ Desktop publishing specialist
  - 80 hours
- ✓ Co-editor and other internal reviewers
  - 40 hours



# State of the Climate for 2002

## Contents of Primary Sections

### ✓ Global Summary:

- Surface and upper air temperature
- Global precipitation and snow cover

### ✓ Tropics:

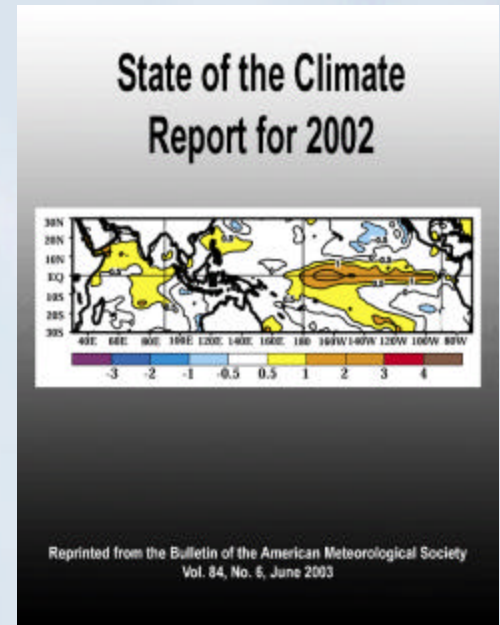
- ENSO
- Tropical Systems

### ✓ Polar Regions:

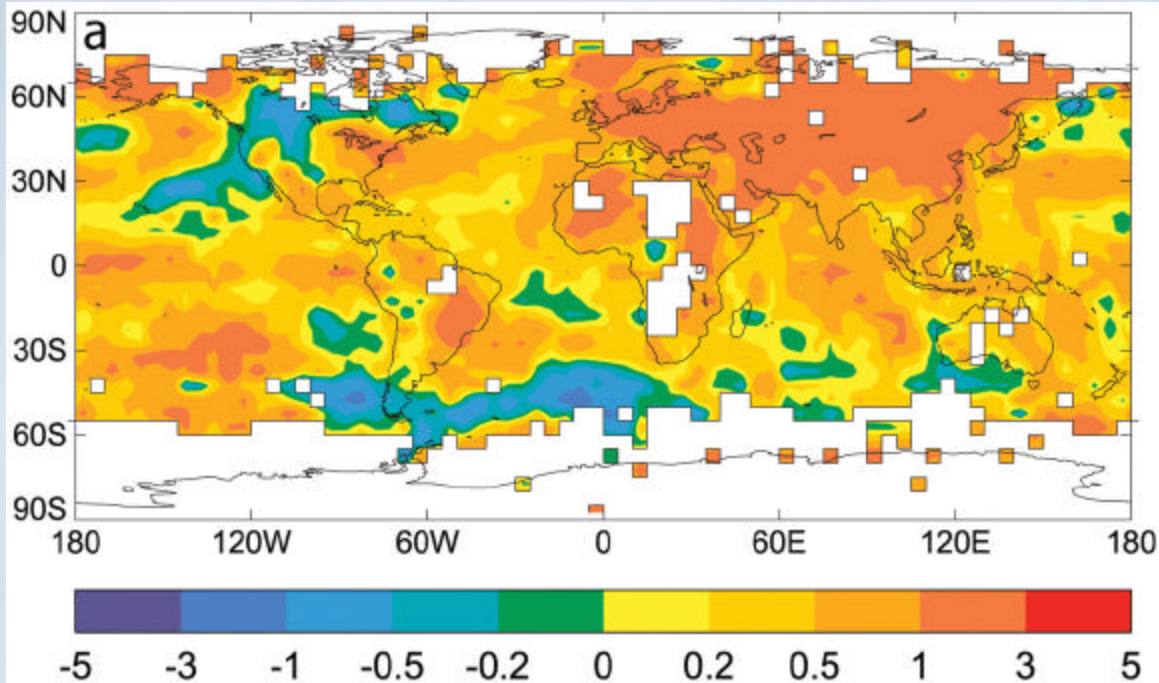
- Stratospheric ozone hole
- Temperature and sea ice

### ✓ Global Regional Highlights:

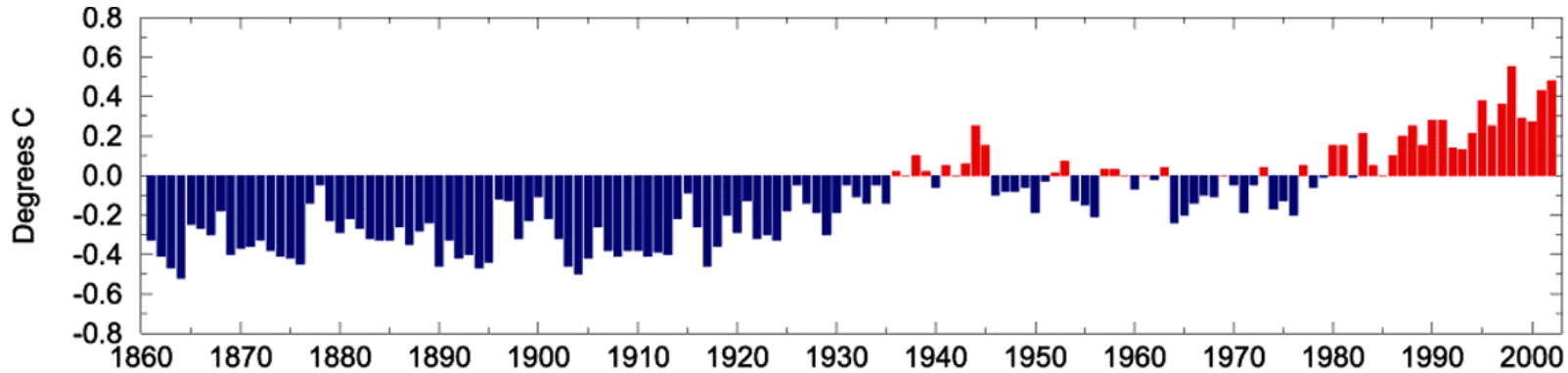
- North America, South America, Europe, Asia, Africa, and Australia



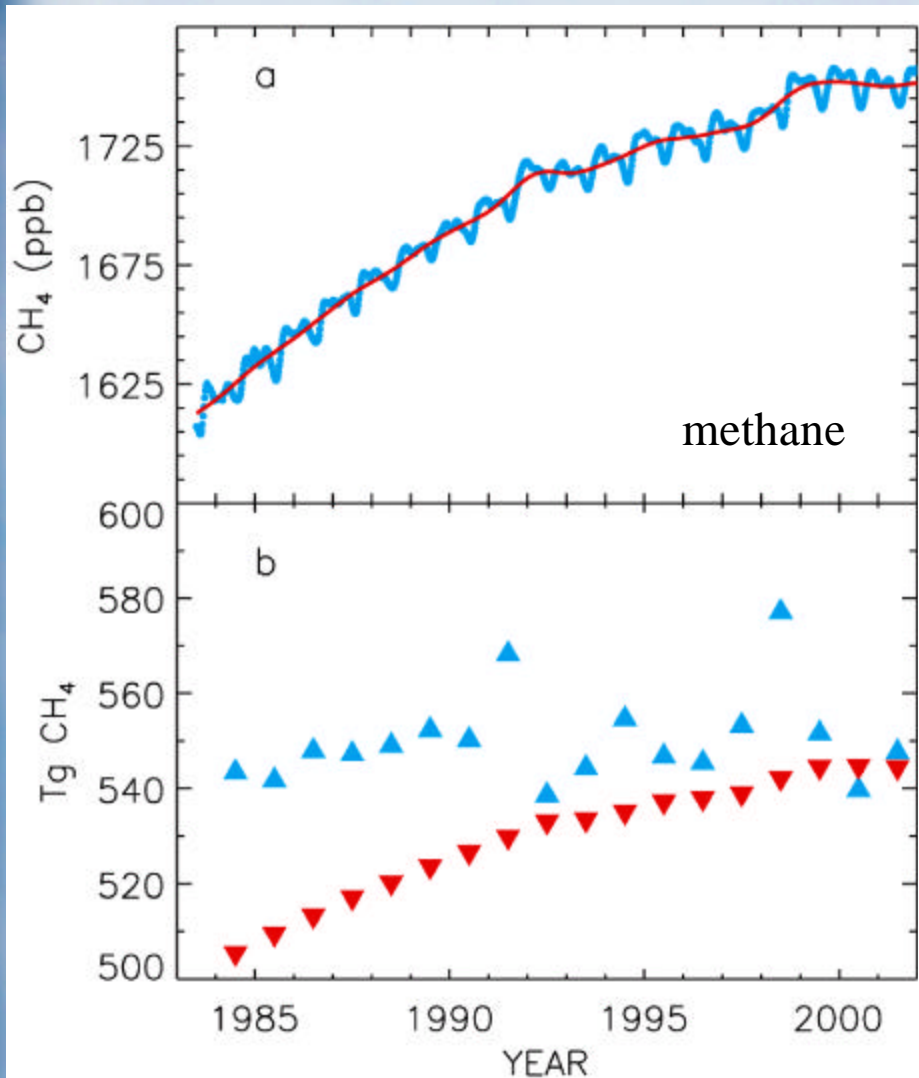
# Global Surface Temperature



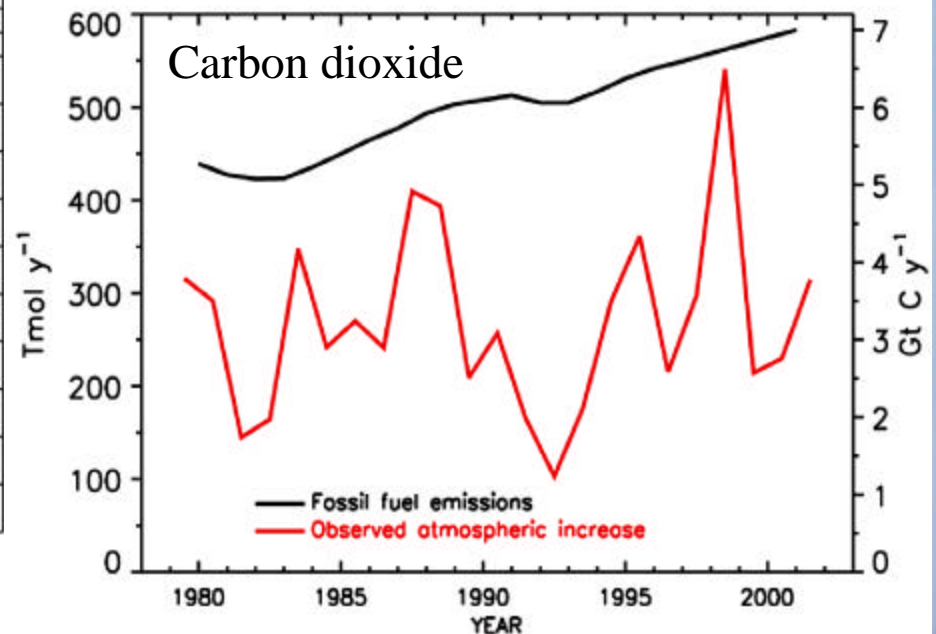
- ✓ 2<sup>nd</sup> warmest year on record for the globe
- ✓ 0.55°C above long-term mean
- ✓ ~0.6°C trend since 1900



# Trace Gases

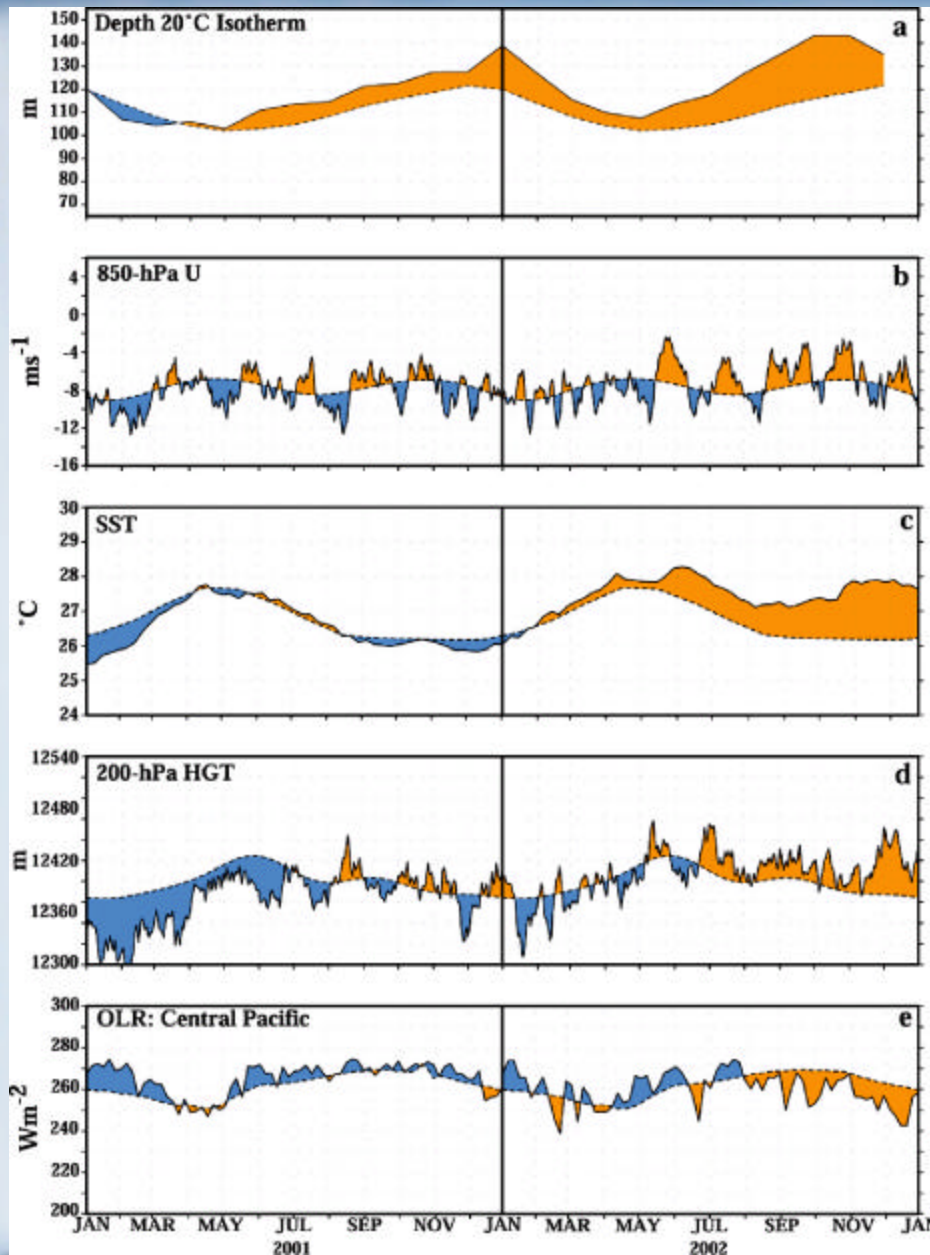


- ✓ Methane leveled off
- ✓ Carbon dioxide and Nitrous oxide – increasing
- ✓ CFCs decrease over next decade



# ENSO

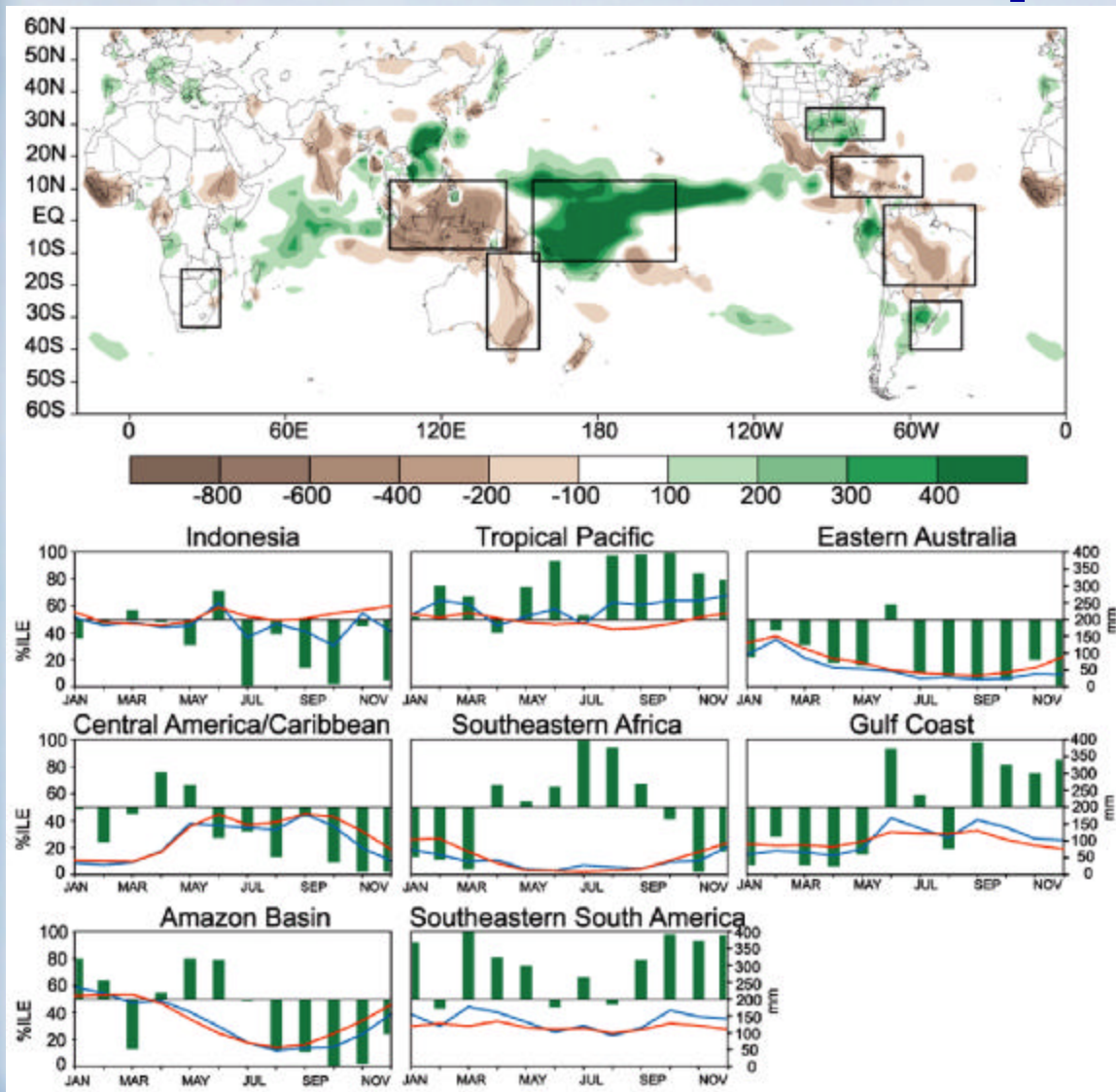
El Nino Southern Oscillation



- ✓ Early deepening of thermocline (May 2001)
- ✓ SSTs warmer than average – February 2002
- ✓ El Nino developed May-August, 2002
- ✓ Strengthened September-December 2002 (SSTs  $+1.75^{\circ}\text{C}$ )



# Global Precipitation

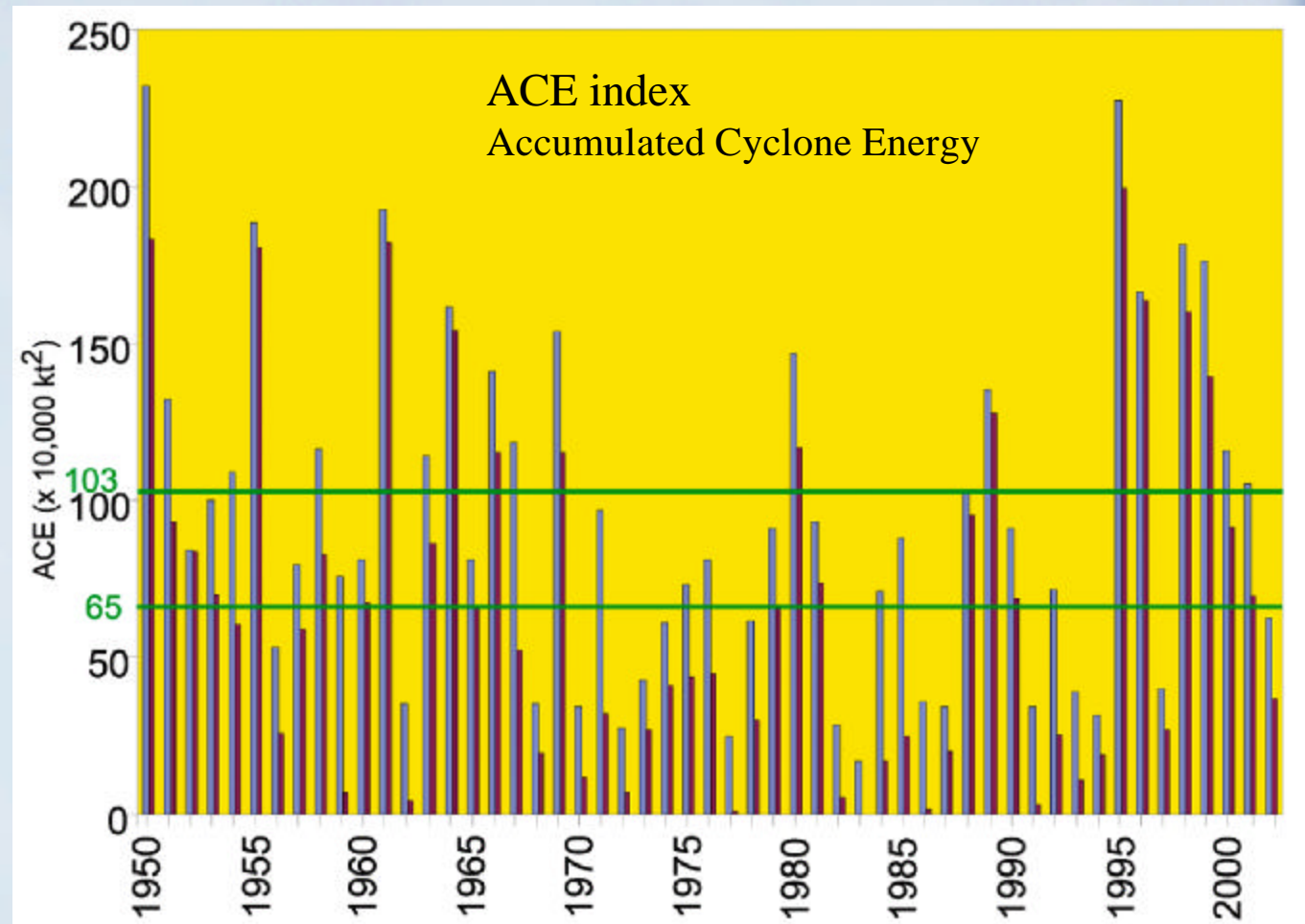


- ✓ El Nino signatures became evident June-December
- ✓ Global land-surface precipitation near 1961-1990 average
- ✓ General increase in global precipitation over the century – more than 10% from 55°N-85°N



# Hurricane Season - Atlantic

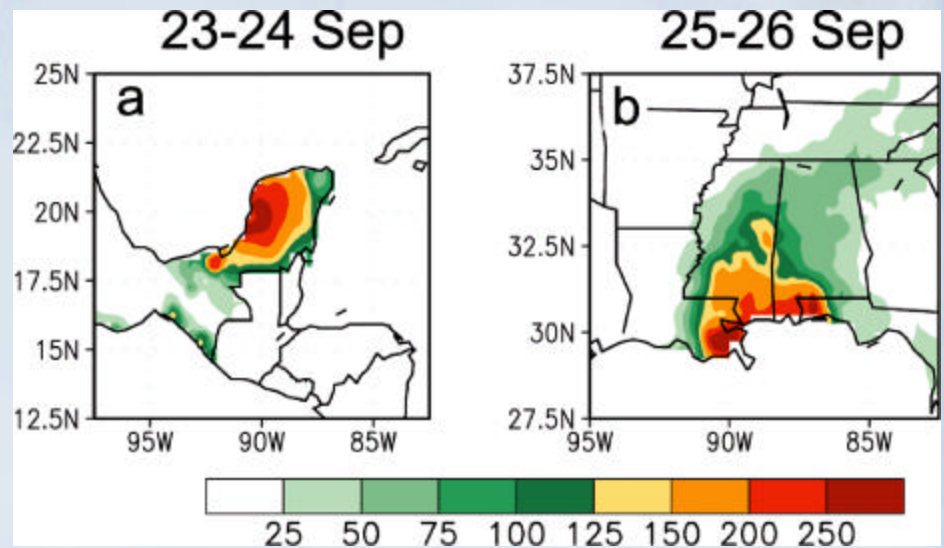
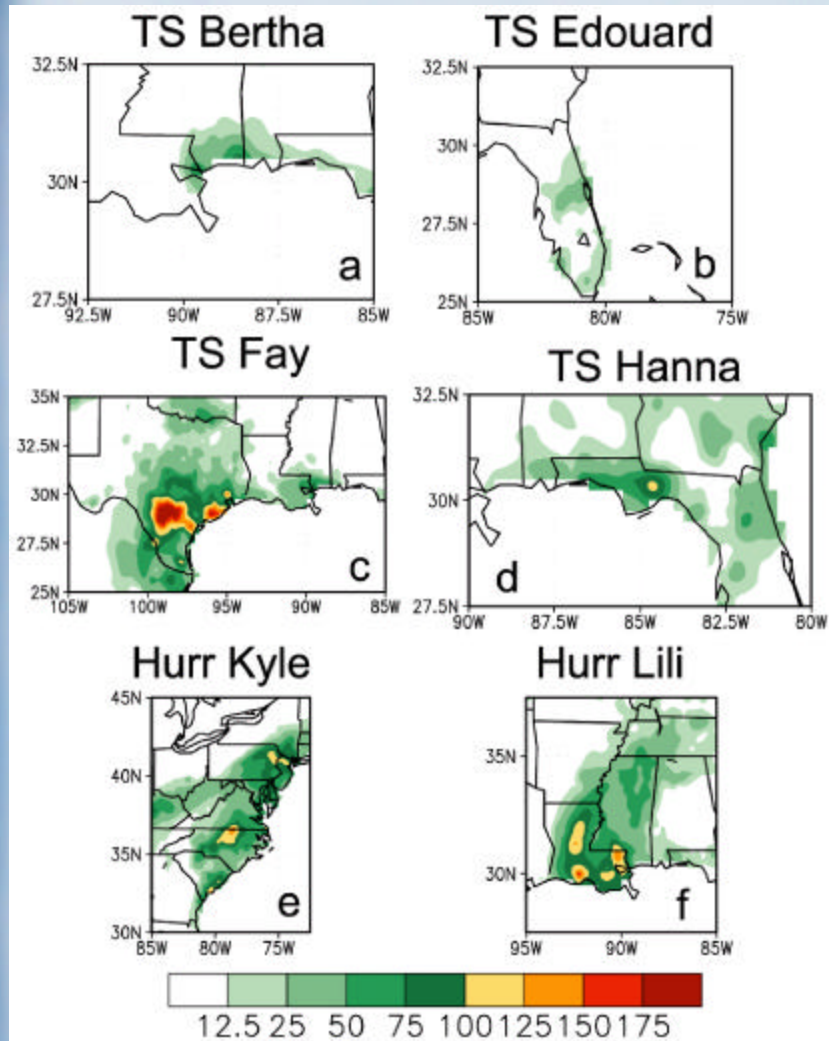
- ✓ Below average activity in 2002
- ✓ Suppressed due to El Nino
- ✓ First hurricane (Lili) to make landfall in US in 3 years
- ✓ September - most tropical systems of any month on record



Active season for landfalls in the Gulf of Mexico



# Precipitation from landfalling tropical systems in the US in 2002

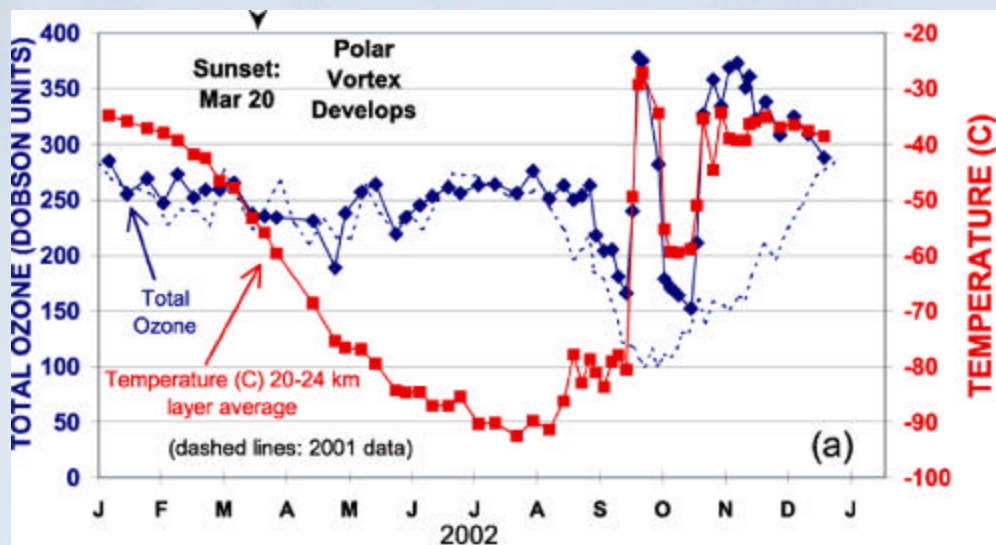


Hurricane/Tropical Storm Isidore

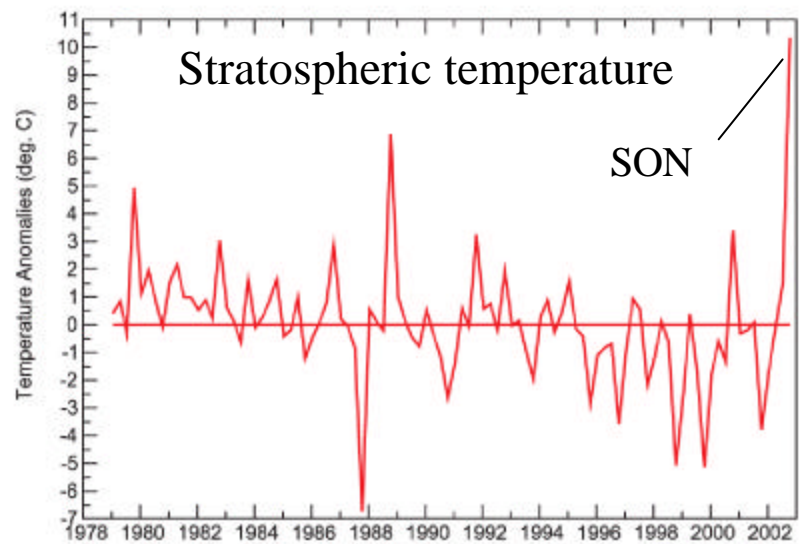
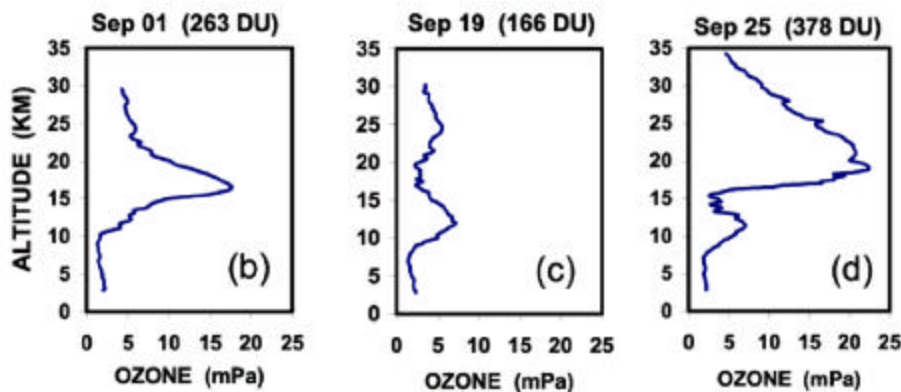
Tropical systems – 40-50% of normal Aug-Oct rainfall for some Gulf coast regions in 2002



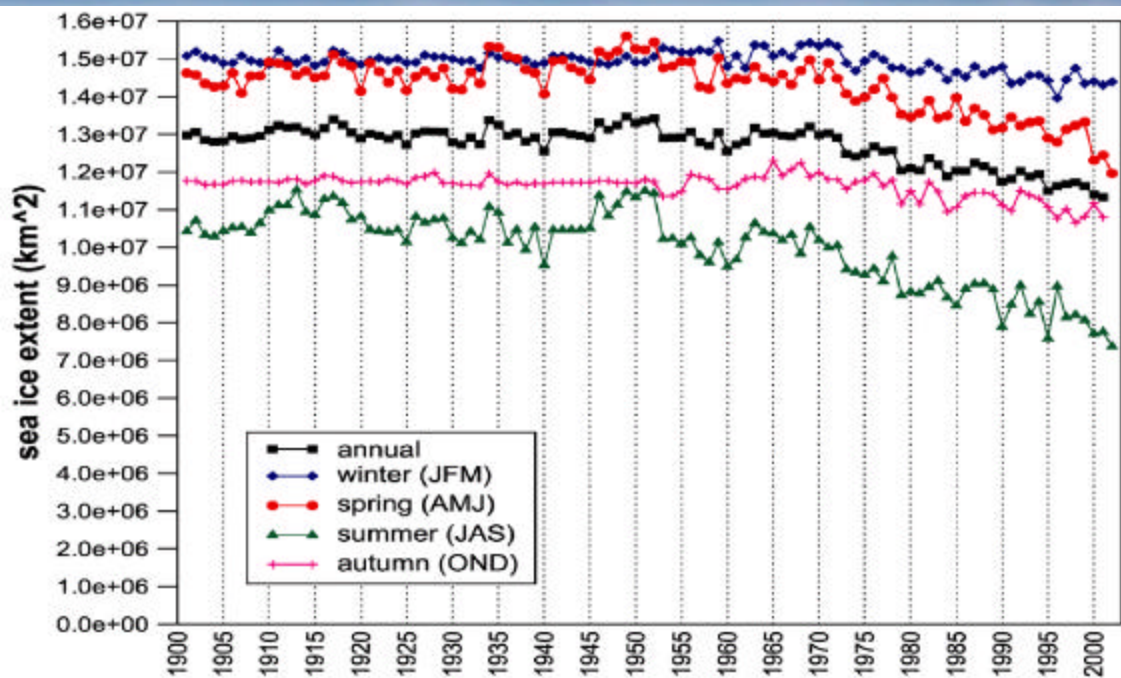
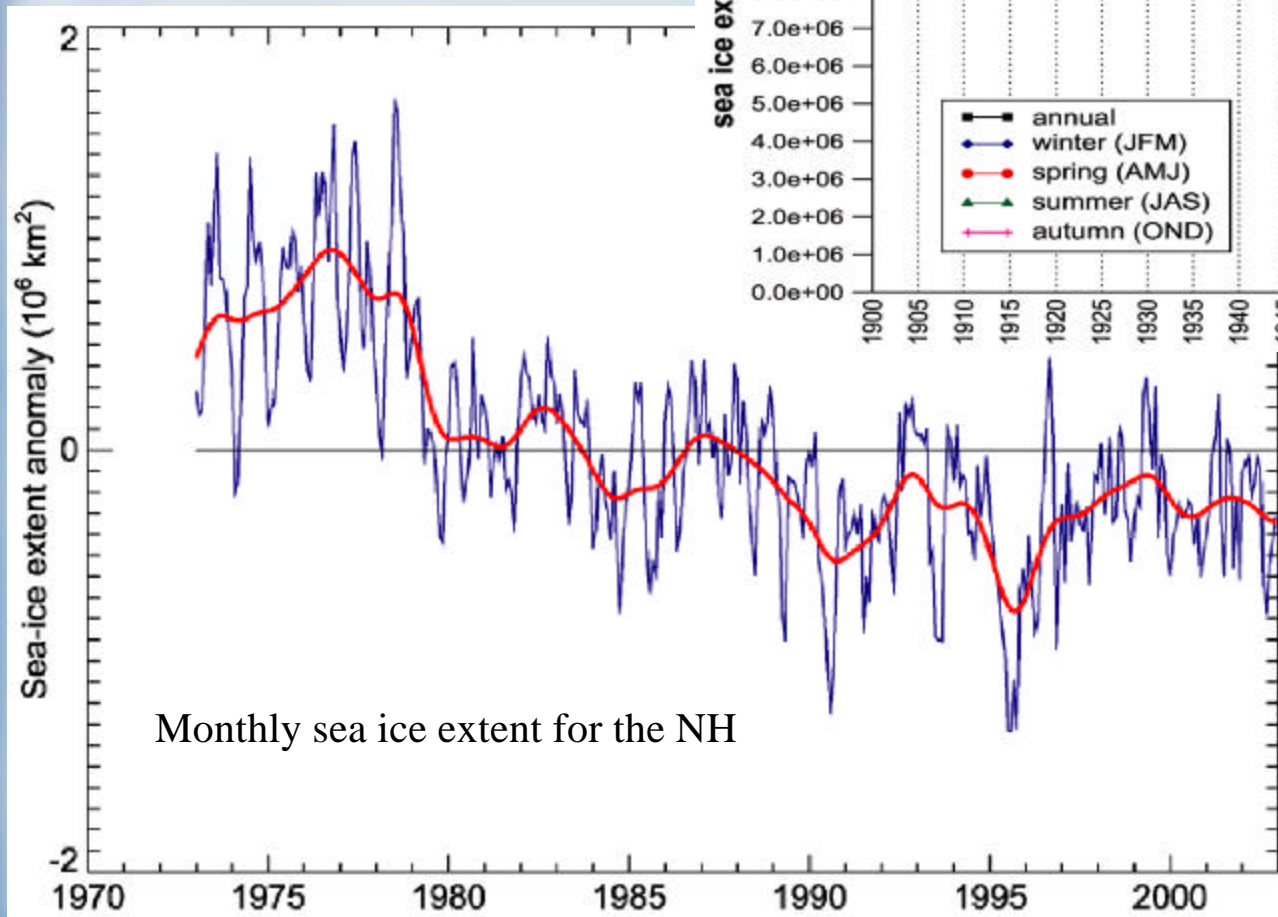
# Polar Climate – Antarctic Stratospheric Ozone



- ✓ Unprecedented 'split' in ozone hole
- ✓ Smallest ozone hole in last decade



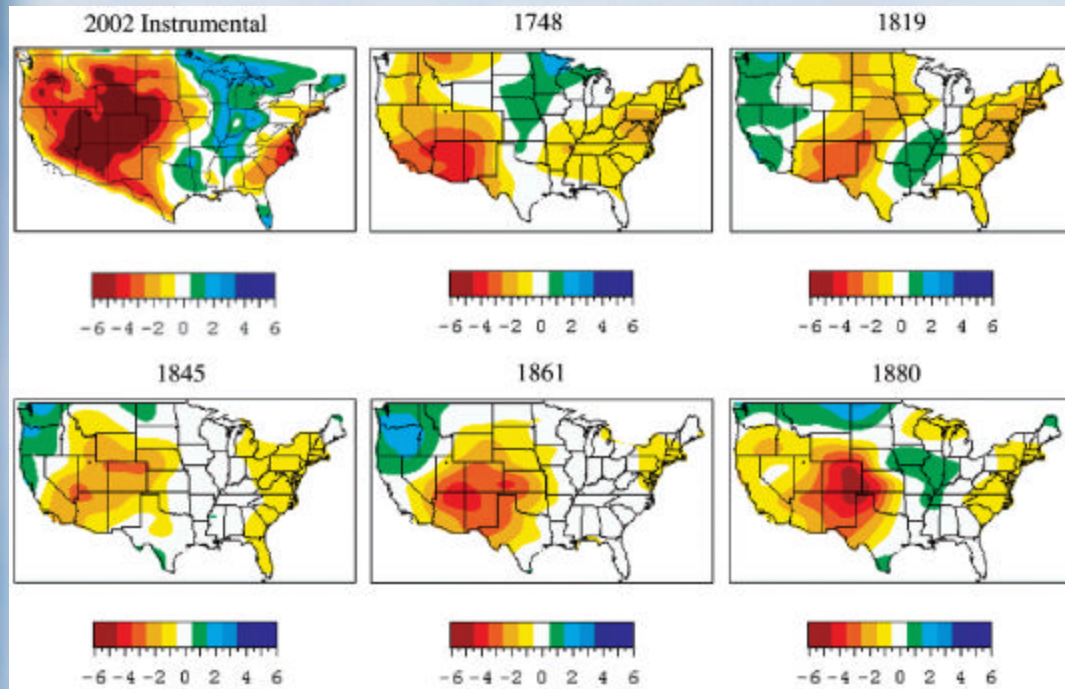
# Polar Climate – The Arctic



Northern  
Hemisphere  
Sea Ice Extent  
lowest on record  
for year, spring  
and summer

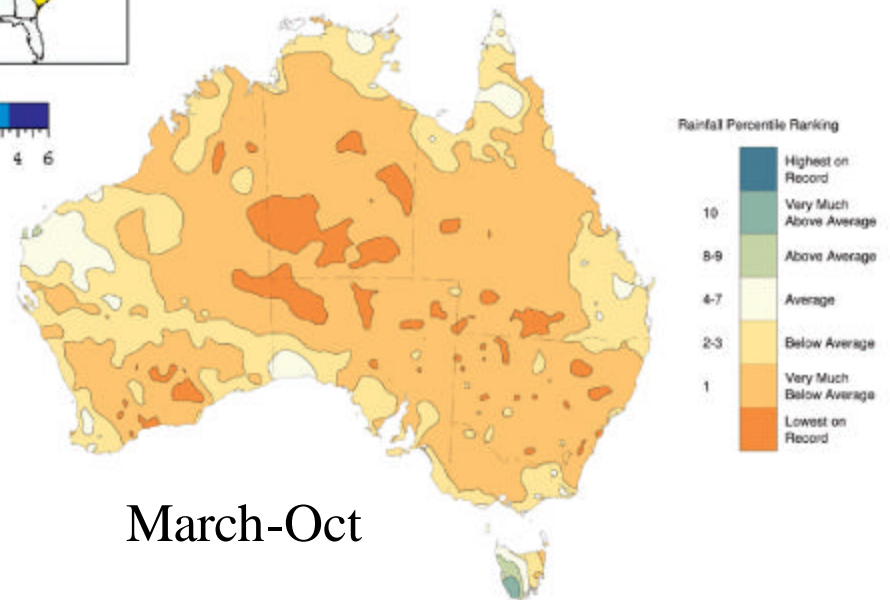


# Global Regional Drought



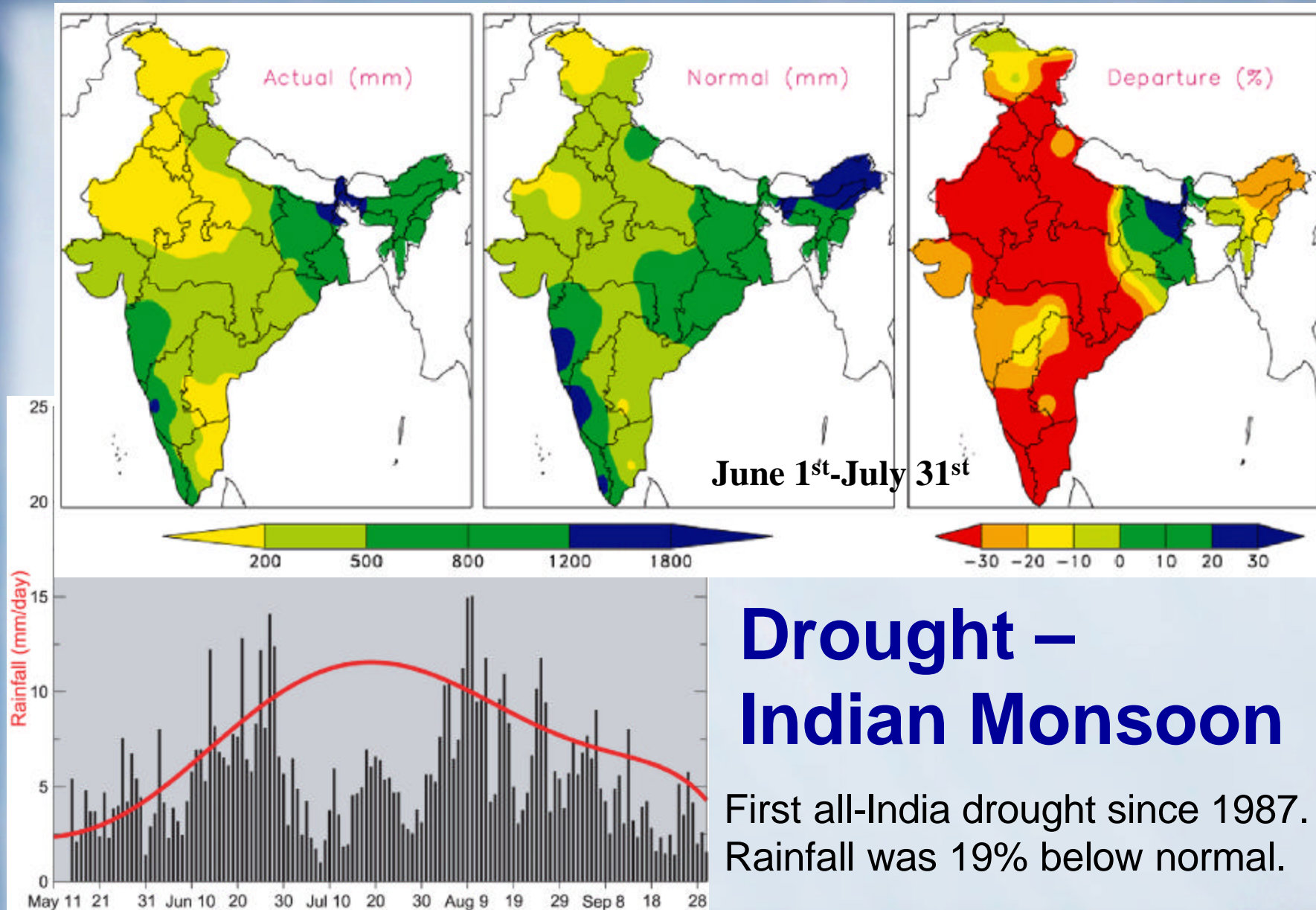
- ✓ Canadian Prairies, West Africa, Central America, India, China.
- ✓ Australia – 4<sup>th</sup> driest year on record: Mar-Oct extremely dry

US drought rivals 1930s and 1950s and more extensive than droughts of the last several centuries (based on tree-ring reconstructions)



March-Oct





## Drought – Indian Monsoon

First all-India drought since 1987.  
Rainfall was 19% below normal.



# Summary

## State of the Climate Reports

- ✓ Substantial investment (one entire branch plus numerous national and international contributors)
- ✓ Only possible because:
  - Large investment in dataset development over many years
  - Extensive global monitoring network in place
  - IPCC background work

